

Restoration Workforce Development Project

Introduction

Northern Arizona University (NAU) and Working for Rivers (WfR) will assemble a highly qualified team to develop a comprehensive program that will train college-age youth and minority youth for service corp work in river restoration and other natural resource fields. Our team will include partners from the National Park Service (NPS), the Youth Service Corps, and various regional experts.

Project Goals

The project will span a 5-year period; during this time frame, we plan to accomplish several key goals:

- Develop a restoration training model to build workforce capacity nationwide.
- Train up to 450 ready-to-work youth (ages 18–25) in best management practices (BMPs) for river restoration.
- Create an adaptable, replicable model for training a conservation and youth corp workforce.
- Deliver nine 5-day workshops across the Intermountain and Pacific West regions. The benefits of these workshops will include 10,500 hours of on-the-ground native plant restoration and rehabilitation on NPS lands.
- Increase environmental awareness and a sense of stewardship for natural resources.
- Develop strong ties between youth and the National Parks in the U.S.

Our program will give participants restoration expertise, hands-on-experience, college credit, and support materials so they learn safe, effective techniques for manually removing invasive non-native species, using herbicide in remote environments, and replanting native species. Participants will also learn and practice leadership skills.

In a nutshell, our program is designed to create a training model to build a workforce ready to meet the need for river restoration through conservation-related jobs within the NPS, youth corp and similar organizations. Participants will gain the knowledge and skills to effectively enter the workforce as restoration specialists. Our NPS partners will see immediate impact through restoration of degraded NPS lands.

An Adaptable, Replicable Model

Our program will develop a model to deliver ongoing, hands-on, field-based workshops to build riparian restoration workforce capacity throughout the Intermountain and Pacific regions. After conducting nine workshops, we anticipate having a replicable model that can be adapted to specific regions and taught to natural resource workers throughout the U.S. and other countries.

Each seminar will include an environmental education component so participants understand the ecological, cultural, planning, and regulatory concepts behind restoration. The program will target students, youth corps members, and other interested parties. Participants will learn about phases of river restoration: initial planning, the removal of invasive species, planting of native vegetation, monitoring, and success evaluation.

Why a River Restoration Program?

National parks are home to some of our nation's most valuable natural resources. Unfortunately, many of these resources are badly degraded and require restoration. Currently, the need for labor-intensive restoration and rehabilitation work on these lands exceeds NPS' capacity and budget. A replicable, nation-wide model is needed to create a workforce that is trained to do restoration work on NPS lands. Current opportunities for applied, on-the-ground trainings that focus on special techniques and safety measures are limited.

Invasive species are among the greatest threats to fragile river ecosystems and critical riparian

habitat. Throughout the Intermountain and Pacific West regions, tamarisk (*Tamarix spp.*)—or saltcedar—has invaded nearly 1.6 million acres of floodplains, leading to negative impacts such as decreased biodiversity, narrowed stream channels, displaced native vegetation, decreased wildlife habitat, and a limited ability for humans and wildlife to use river corridors.

Wildfires have also become a major threat. The tamarisk beetle (*Diorhoda elongata*) was released into the Western U.S. in 2004 to combat the monotypical stands of tamarisk that have spread along hundreds of miles of river corridors. The beetle has exceeded expected defoliation rates and is now migrating to a larger area than anticipated, producing vast stands of dead, dry trees across portions of the Southwest. As a result, the threat of wildland fire has increased throughout the region, increasing the need for a trained workforce to remove dead trees and restore riparian areas with native vegetation.

With our nation's unemployment rate at 8% and rising, job creation is becoming more important. River restoration is an excellent way to create employment opportunities. Most restoration projects use heavy machinery to remove invasive species—an approach that is effective but can disrupt soils and disturb riparian areas. Mechanical restoration approaches employ a limited workforce and are not viable on fragile, remote NPS lands where the visitor experience and access must be considered. Hand clearing with saws or chainsaws, followed by a spot herbicide application, has proven far less disruptive and more effective in halting the regrowth of non-native species.

Our methods teach active restoration, which emphasizes the importance of replanting native vegetation to avoid erosion, to deter the reinvasion of non-native species, and to provide critical riparian habitat for wildlife species and recreational enjoyment.

Why a focus on River Restoration in the Intermountain and Pacific West Regions?

Rivers are ribbons of life in the arid Southwest including Arizona, Nevada, parts of California,

and Utah. Although they make up a small percentage of the landscape, they provide a disproportionate amount of habitat to bird and wildlife species. For example, in Grand Canyon National Park, even though the riparian areas typically account for less than 2% of the landscape, they provide critical shade, water, and food for up to 90% of all bird species and 80% of all mammal species. Therefore, restoring and rehabilitating rivers in the Intermountain and Pacific Regions can have significant positive effect on these vital ecosystems.

Past Performance

Our team brings a wealth of experience and demonstrated successes in rehabilitating degraded rivers using hand-removal and replanting methods to restore ecosystem integrity. We also bring educational expertise to effectively teach these methods to others. Team members include restoration practitioners, an accredited university, natural resource scientists, botanists, hydrologists, landscape architects, youth service coalitions, and crew leaders. We have successfully restored riparian corridors throughout the West.

The following descriptions summarize a few of these projects. Additional information for these and other projects is available upon request. Contact information is provided under “References” on page 3.

Yuma East Wetlands Restoration

This multiphase, multiyear, 1,400-acre wetland project on the Lower Colorado River now serves as a model for what is possible in this region. The project entailed holding many educational workshops to share planning methods and replanting techniques. Fred Phillips and Tillie Walton have been deeply involved in planning, consensus building, funding, implementation, workshops, and youth outreach events.

Reference: Charles Flynn Contact: Fred Phillips

Yuma West Wetlands Restoration

This successful, 8-year-old, 50-acre riparian and wetland restoration project is the site of the

former Yuma city dump. Today, it is a beautiful restored riparian area along the Lower Colorado River. In addition to providing the community with recreation and enjoyment, it is an excellent restored native riparian habitat. Fred Phillips was involved in the design, implementation, and maintenance; Tillie Walton worked on monitoring and reporting. **Reference:** *Charles Flynn*
Contact: *Fred Phillips*

Transforming Landscapes: Benefits of the Restoration Bi-National Workshop

This workshop was designed to share how wetland and riparian restoration programs can provide social, economic, and ecological benefits, and how such programs might be applied in the Lower Colorado River and beyond. Representatives from the South Africa's Working for Water Program presented their innovative approach for employing 30,000 people annually to clear invasive species. The Yuma East Wetlands restoration project was used to showcase restoration techniques. As a result of this workshop, youth conservation corps became part of regular crews, and a federal pilot project employing 45 people in Mexico began this month. Tillie Walton conceived and spearheaded the conference in collaboration with the Environmental Defense Fund. Fred Phillips showcased the YEW. **Reference:** *Mary Kelly*

Glen Canyon River Restoration

This plan restores 15-miles along the Colorado River corridor from Glen Canyon Dam to Lees Ferry within Glen Canyon National Recreation Area. Implementation of the 6-acre pilot project began last spring. Tamarisk was hand-cleared using youth crews, other paid workers, and volunteers. This area, and other priority sites identified under *The Colorado River Master Plan: A guide to restoring and enhancing native habitat along the Colorado River from Glen Canyon to Lees Ferry*, would be part of the first potential restoration workshops under this proposal. Dr. Larry Stevens has been spearheading the project; Fred Phillips was involved in the funding, de-

sign, and planning; and Tillie Walton was involved in the planning and site selection process. **Reference:** *Kelly Burke* **Contacts:** *Larry Stevens, Fred Phillips*

Lees Ferry Restoration

This 12-acre demonstration project at Lees Ferry, located on the Colorado River at the entrance to Grand Canyon National Park, laid the foundation for the *Glen Canyon Restoration Master Plan*. Tamarisk was removed from the site and native vegetation was planted, irrigated, and monitored for success. Educational signage was developed, and a public outreach effort was initiated. Dr. Larry Stevens led the effort, developed the design, and implemented the project; Fred Phillips implemented the project, and Tillie Walton helped conduct the field studies, site monitoring, and project reporting. **Reference:** *Kelly Burke* **Contacts:** *Larry Stevens, Fred Phillips*

Grand Canyon National Park Tamarisk Management & Tributary Restoration

In partnership with the Grand Canyon Trust and NPS, crews mechanically and chemically removed tamarisk on over 100 side canyons of the Colorado River throughout Grand Canyon. Methods included pulling, cutting to stump level, and applying herbicide or girdling to leave the dead tree standing for wildlife habitat. The combination of hand tools and herbicide has ensured maximum effectiveness with minimum impact to visitors and the environment. To date, crews have completed work in 130 project areas, removing more than 256,000 tamarisk trees from over 5,000 acres of the park's inner canyon. **Reference:** *Lori Makarick*

Technical Approach

The methods used for workshops are based on similar projects conducted by our team of experts over many years. Every workshop in the program will have a detailed, project-specific plan administered by the restoration project leader. Components will be taught by various restoration professionals who have the most expertise in that field and location. On-the-ground

crew leaders will monitor progress and evaluate the process throughout the life of the workshop.

Outreach

Outreach to publicize program activities and outcomes will be ongoing through the life of the project. During the final phase, the workshop curriculum, course materials, and implementation protocols will be made available online in electronic form. Outreach efforts will focus on informing relevant agencies and organizations about this restoration training resource.

Measuring the Program's Success

The efficacy of our program will be gauged by the success of the individual workshops as measured by post workshop evaluations completed by participants, NPS restoration site partners, and workshop presenters; as well as by a longitudinal study to determine the number of participants who engage in river restoration or other natural resource conservation work after completing the program. Following each workshop, evaluation results will be compiled into a report summarizing strengths and weaknesses of the workshop and making recommendations for change. These reports will be used by the project team to adapt materials and methods for subsequent workshops to maximize their value to participants and partners. Results will also be compiled in the annual and final reports to the NPS.

Site Locations

Workshop sites on NPS lands will be chosen based on criteria that meet the goals and objectives of the program. Regional experts will be employed to share their knowledge of local invasive species and native vegetation and to bring the most pertinent experience to the park. Garlon® will be used to control invasive species after hand clearing. During the field sessions of our workshops, trained crews will ensure the proper use of saws and other equipment, and all removal and replanting techniques will be supervised by experienced crew leaders who have worked on similar projects in a variety of settings.

Cost Control Measures

Key benefits of this program are capacity building through training an experienced restoration workforce; creating an adaptable, replicable model that can be applied in other NPS regions and service corps programs throughout the country; and on-the ground restoration.

This exemplary and innovative program will offer participants college credit, certification and five days of field-based training for a direct program cost of about \$1600 per participant. Developing and optimizing the workshop curriculum and course materials will be accomplished at a one-time direct cost of \$115,000. We project that the 450 attendees of the workshops will provide 10,800 hours of in-kind volunteer labor on NPS lands. We calculated this nonprofessional labor rate at 60 percent of the average professional labor rate in northern Arizona (based on quotes from Lake Mead Exotic Plant Management Team and Coconino Rural Environmental Corps) and added in 25% for payroll expenses. This contributes \$162,000 of in-kind value over the life of the program.

Best management practices and standard accounting procedures will be applied during regular project reviews to track costs associated with each task. A review of OMB circular A-122 and OMB A-21 was conducted to confirm that all proposed costs are allowable in accordance with Federal cost principles. Labor for projects on NPS land will be provided by the participants.

Health & Safety

Risk and safety concerns will be managed by bringing in the appropriate professionals wherever needed. Many staff members from NAU, WfR, and subcontractors are certified Wilderness First Responders. This rigorous course involves 80 hours of training consistent with urban First Responder standards, expanded and adapted for emergency care in the wilderness. Safety equipment will be provided, job hazards and with protocols for using protective outerwear will be covered prior to field work. Prior to each day in the field, participants will participate in a safety briefing about the techniques and procedures specific to the site activities. Chain-

saws will only be handled by qualified experts who have undergone extensive training. Participants will be trained in chainsaw safety awareness but they will not handle the equipment.

Additional safety procedures will be employed for dealing with herbicides. Experienced, licensed applicators will demonstrate proper storage, handling, and application to all participants. A representative from the U.S. Department of Agriculture will also brief participants and conduct testing for an applicators license. All participants handling herbicides will be required to have an applicators license before handling any herbicides. The workshops will be conducted in remote locations supervised by WfR staff experienced in remote field operations and 'leave no trace' protocols. A professional cook crew will be responsible for food handling and camp organization. First aid equipment and a satellite telephone will be available at every workshop site in case of emergencies or medical evacuation.

Training & Education

The workshop is aimed at students, youth corps members, and minority youth between 18 and 25 years of age. We will also recruit youth corps staff and government and non-profit agency personnel interested in managing restoration work or leading crews. The workshop will be available for credit through NAU, an option that will encourage participation from university students across the region. Recruitment methods will include online announcements on job and internships sites and partner websites, electronic newsletters, list-serves, articles in print and online media, presentations at relevant meetings and conferences, and networking with partner organizations and land management agencies. Key recruiting partners include NAU's Institute for Tribal Environmental Professionals (ITEP) and Ecological Restoration Institute (ERI), regional tribal governments, youth groups, NPS partners, and the Mountain Alliance of Youth Corps. Regional youth conservation corps will be critical for building a recruitment base, strengthening relationships between youth and National Parks, and building capacity for restoration on NPS lands into the future.

Participants will apply to the workshop through a simple form (on-line and paper) that provides name and contact information, a brief work history, and a short summary of the participant's interest in restoration. Up to 50 applicants will be accepted into each workshop. If oversubscribed, the planning team will review applications and select applicants based on their statement of interest in restoration. A waiting list will be maintained to accommodate cancellations. Selected applicants will be provided an orientation packet by e-mail or U.S. Mail containing workshop details (date, time, location, content and schedule), a summary of expectations, a description of field conditions, a gear checklist, and study materials to read prior to arrival. A week prior to the workshop, the planning team will contact participants to confirm their participation and notify people on the waiting list if there are cancellations.

The first day of the workshop will be conducted in the classroom, with subsequent days in the field. An orientation in the classroom will review the workshop schedule and content, outline expectations, and brief students on safety, rules of conduct, and leave no trace practices for the field portion of the workshop. The classroom portion will consist of presentations from restoration practitioners to cover why restoration is important, steps involved in the restoration process, examples of sites before and after restoration, restoration techniques, and lessons learned. In the field, instructors will orient participants to the site and review safety precautions and experts from each area will cover one day on each of the following topics:

- 1) Introduction to Restoration and Field Preparation
- 2) Practical Guide to Herbicide Application – Road Access and Remote Applications and Chainsaw Awareness
- 3) Replanting and Monitoring Techniques
- 4) Leadership Skills

The program will reach out to a broad demographic sector with a focus on 18 to 25 year olds. Of the total 450 participants to be trained in nine workshops over five years, we expect many to come from NAU's diverse student

population (22,507 total) representing 50 states, 65 countries, and 48 Native American Tribes. The workshops will be directly applicable to natural resource programs and students will receive academic credit for their participation. We will also work closely with tribal organizations to encourage participation from Native American youth. The program will provide opportunities for young adults from all backgrounds to enter the conservation related workforce with the skills necessary to succeed.

Workshops will be designed to develop vocational skills that can lead to meaningful employment as well as increased awareness and interest in environmental volunteer and employment opportunities. NPS units and youth conservation corps across the United States will be able to recruit from this trained workforce.

Workshop participants will gain the following vocational and professional knowledge, skills and benefits.

- Plant identification
- Manual removal techniques for invasive species
- Planting techniques and procedures
- Herbicide applicator's license
- Equipment awareness and safety skills
- Plant monitoring techniques
- Leave no trace camping skills
- Leadership training
- Restoration field experience
- Course credit (optional)
- Workshop certification
- Access to youth service corp employment opportunities and NPS volunteer programs

Sample Restoration Workshop Topics

Restoration Introduction and Field Preparation:

- Why restoration is necessary
- Problems associated with non-native species and benefits of native plants
- Plant identification skills
- Brief overview of what it takes to put together a riparian restoration project
- Fieldwork preparation

- Safety
- Equipment and protective gear
- Planning for the unexpected
- State testing and licensing for herbicide application

Practical Field Training when Working with Crews Using Saws or Chainsaws

- Safety
- Site assessment and planning
- How to cut lines into dense thickets for easiest removal
- How to run a cutting and herbicide crew simultaneously
- How to handle removed biomass
- On-the-ground practical methods – manual removal of woody material from site

Stump-cut Treatment for Tamarisk Using Herbicide

All participants will be required to have their state applicators license to apply Garlon.

- Safe transport, handling, and application practices
- Practical application techniques including backcountry and front-country techniques for working in remote areas as well as road accessible areas
- Field practice under the guidance of experts

Replanting Techniques

- Plant harvesting methods
- Preparation of plant material for planting
- How to plant cottonwood, willow, bulrush, grass plantings and other native species
- How to plant in areas that will maintain plant growth
- Proper planting techniques for cuttings, propagules, and plugs
- Plant monitoring techniques
- Practical hands-on field experience

Leadership Skills for Crew Leaders

- How to lead a crew
- How to keep a crew motivated and in good spirits

- How to handle group dynamics and conflicts
- How to handle emergencies
- Ensuring quality control and a job well done
- Employment opportunities

For the first workshop, we proposed to partner with Glen Canyon National Recreation Area (GLCA) and Grand Canyon Wildlands Council (GCWC), a local non-profit organization. These groups have developed a comprehensive riparian restoration plan for 15 miles of the Colorado River extending from Glen Canyon Dam to Lees Ferry. This project takes place in an area that can only be accessed by river and involves manual clearing of invasive tamarisk and replanting of native habitat. The classroom portion of this workshop will be conducted by Dr. Larry Stevens who will provide a background on the scientific need for ecosystem restoration and greater biodiversity. Tillie Walton, founder of Working for Rivers, and landscape architect Fred Phillips, owner Fred Phillips Consulting, will provide overviews of the restoration process, recent restoration projects, a history of past successes, and job opportunities in the restoration field. Patricia West, ethno-botanist from NAU, Kate Watters, botanist from Grand Canyon Trust, and Lori Makarick, NPS Vegetation Program Manager, will educate participants on identification of invasive non-native and native species in the project area. Additionally, herbicide application techniques will be discussed in the classroom and demonstrated in the field. A representative from the U.S. Department of Agriculture will be on hand to provide additional information and test applicants to receive the required applicators license before commencing field work. The field sessions of our workshops will use trained crews from the National Park Service's Lake Mead Exotic Plant Management Team to ensure the proper safety around chainsaws and other equipment, and all removal and replanting techniques will be supervised by experienced field crew leaders who have worked on similar projects in a variety of settings. Students will leave the workshop with support materials including a certificate of completion and information on related job opportunities and potential employers.

Summary of Benefits

This Restoration Workforce Development Project is an innovative, collaborative approach to meet the critical need for cost-efficient restoration on degraded NPS lands. It engages youth in hands-on environmental conservation and builds workforce capacity for the future. This endeavor provides the additional benefit of engaging highly respected restoration professionals to develop a restoration training workshop based on best practices with national and international application. As a pilot project, this effort will create an adaptable and replicable model that can be applied to build workforce capacity across the nation. The workshop model, materials, and its work-ready graduates will provide ongoing impact long after the conclusion of this project.